

DECLARATION

I, Seiichiro Takahashi, a Japanese Patent Attorney registered No. 10740, of Okabe International Patent Office at No. 602, Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo, Japan, hereby declare that I have a thorough knowledge of Japanese and English languages, and that the attached pages contain a correct translation into English of the priority documents of Japanese Patent Application No. 10-283149 filed on October 5, 1998 in the name of CANON KABUSHIKI KAISHA.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

signed this *14th* day of November 2003


SEIICHIRO TAKAHASHI

PATENT OFFICE
JAPANESE GOVERNMENT

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[Name of the Document]	Specification
[Title of the Invention]	Image Reading Device
[What is claimed is]	

[Claim 1]

An image reading device, characterized by:
an operating section openable/closable to a device body and having a reading section guide for guiding and conveying a supplied document;

a reading section having reading means disposed opposite to said reading section guide for reading image information of the conveyed document, and being attachable to/detachable from said device body; and

one mounting detecting means for detecting opening/closing of said reading section guide or attachment/detachment of said reading section with respect to said device body,

wherein said mounting detecting means comprises a detecting sensor disposed in said operating section, and an actuating member movably disposed in said operating section and moved by said reading section attached to said device body to turn on/off said reading sensor.

[Claim 2]

The image reading device according to claim 1, characterized in that said reading means comprises a contact-type image sensor.

[Claim 3]

The image reading device according to claim 1 or 2, characterized in that said operating section has said reading section guide and an operating panel provided with a plurality of operating keys, display means, etc.

[Claim 4]

The image reading device according to claims 1 to 3, characterized in that said detecting sensor comprises a photointerruptor.

[Claim 5]

The image reading device according to claims 1 to 4, characterized by transmitting means for allowing a user, when said mounting detecting sensor detects that said reading section is detached from the device body or that said operating section is opened when the power of said device body is turned on, to recognize the fact.

[Claim 6]

The image reading device according to claim 5, characterized in that said transmitting means is display means disposed in said operating section.

[Claim 7]

The image reading device according to claim 5, characterized in that said transmitting means is a speaker disposed inside the image reading device.

[Claim 8]

The image reading device according to claim 5, characterized by a recording section for recording an image on a recording sheet to be conveyed inside the device body

thereof, wherein said transmitting means is a recording operation onto a recording sheet to be performed by said recording section.

[Claim 9]

The image reading device according to claims 1 to 8, characterized by a white reference member having a white reference face as a reference for a shading of a document to be conveyed inside said reading section guide at a position to be opposite to said reading means, so as to read the shading of said document on the basis of the white reference data obtained by reading said white reference face by said reading means.

[Claim 10]

The image reading device according to claims 1 to 9, characterized in that said reading section functions as a hand scanner capable of manually reading the document when said reading section is detached from said device body.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to an image reading device, particularly to an image reading device, for example, which has a reading section detachably attachable to a device body and an openable/closable operating section.

[0002]

[Conventional Art]

In recent years, it has been desired that the image

reading device should be able to read thin sheet documents as well as thick documents such as brochures and books. Moreover, there is a demand for means for removing the document from the device body when the reading operation of the device is abnormally stopped halfway.

[0003]

As examples of the means to attain the reading operation of the thick documents for the image scanner, the copying machine, and the like, many constitutions comprise disposing a document base, laying on the document base the sheet documents or the thick documents such as brochures and books, and moving the document base itself or an image sensor as reading means, to read image information of the documents.

[0004]

In the reading device in which the device body is compact and easily operable, however, it is difficult to dispose a large document base. Therefore, in recent years, to attain the above-described demand, other structure has been increasingly proposed as follows. For example, in a small-size facsimile device, when the thin sheet document is read, a reading section is disposed in the device body, and image information is read by conveying the sheet document. When the brochure, the book, or another thick document is read, some constitutions comprise detaching the reading section from the device body, allowing the reading section to scan on an image plane to be read of the brochure, the

book, and the like, and reading the document image information.

[0005]

Moreover, to remove the document during abnormal stop, in the image scanner or the copying machine, by opening a document base cover, the document may be removed from the document base.

[0006]

However, in small-size reading devices such as a small-size facsimile device, a document conveying path is constituted of upper and lower document guide members. Many constitutions comprise moving the upper document guide member by rotating movement or parallel movement to open the reading document conveying path, and removing the document when the document is abnormally stopped halfway during reading operation.

[0007]

Here, in the image reading device, white reference data is necessary for judging density during image reading, but in the small-size facsimile device, a white reference member for reading the white reference data is disposed in the opposite portion of the image reading device with respect to the document conveying path in many cases. When the sheet document is conveyed into the device body to read the image information, by reading the white reference member every time the reading operation is performed, the white reference data is taken. Moreover, when the reading section detached

from the device body is allowed to scan on the reading image surface to read the image information, the white reference data before detaching the reading section from the device body is frequently used. Therefore, in many cases, the white reference data is usually read when power supply is turned on, so that the reading section can be detached from the device body at any time to perform the reading operation.

[0008]

Here, first, assuming that the device body cannot recognize whether or not the attachable/detachable reading section is attached to the device body, in the operation of reading the sheet document while the detachable/attachable reading section is detached from the device body, the document is not conveyed onto the reading section, so that the image information cannot be read. Moreover, the document conveying is performed while no reading section is disposed in the document conveying path, and there is a defect that improper conveying, and the like could be generated. Moreover, when the reading section is detached from the device body, and power supply is turned on, there is a defect that the white reference data cannot be taken. Because no white reference member is disposed on the reading device.

[0009]

Moreover, assuming that the upper document guide is moved, the device body cannot recognize whether or not the document conveying path is opened, but the document

conveying path is opened, by turning on the power supply, the white reference member itself is detached from the image reading device, or the reading document conveying path is opened. In this case, exterior light enters the image reading face of the image reading device, which causes a defect that the white reference data cannot sufficiently be taken.

[0010]

As the countermeasure of the defect, there is proposed a constitution which comprises a reading section presence/absence detecting sensor for detecting whether the reading section is attached/detached, and a document guide opening/closing detecting sensor for detecting whether the document conveying path is opened, so that the device body recognizes whether or not the detachable/attachable reading section is attached to the device body, or whether or not the document conveying path is opened.

[0011]

[Problems to be solved by the Invention]

However, in the above-described conventional constitution, each of the reading section presence/absence detecting sensor and the document guide opening/closing detecting sensor requires a sensor body, a mechanical component for turning on/off the sensor, an electric circuit around the sensor, wiring for transmitting a sensor ON/OFF signal to the device body, and many other components. The cost increase of the device body cannot be avoided, which also causes a defect that the assembling property and

compactness of the device body are deteriorated.

[0012]

An object of the present invention is to provide a document reading device which can be manufactured at a low cost with the main body in a small size, and is always capable of an excellent reading operation with an excellent assembling performance.

[0013]

[Means for Solving the Problems]

The present invention of Claim 1 is characterized by:

an operating section openable/closable to a device body and having a reading section guide for guiding and conveying a supplied document;

a reading section having reading means disposed opposite to the reading section guide for reading image information of the conveyed document, and being attachable to/detachable from the device body; and

one mounting detecting means for detecting opening/closing of the reading section guide or attachment/detachment of the reading section with respect to the device body,

wherein the mounting detecting means comprises a detecting sensor disposed in the operating section, and an actuating member movably disposed in the operating section and moved by the reading section attached to the device body to turn on/off the reading sensor.

[0014]

The present invention of Claim 2 is characterized in that the reading means is a contact-type image sensor.

[0015]

The present invention of Claim 3 is characterized in that the operating section has the reading section guide and an operating panel provided with a plurality of operating keys, display means, etc.

[0016]

The present invention of Claim 4 is characterized in that the detecting sensor is a photointerruptor.

[0017]

The present invention of Claim 5 is characterized by transmitting means for allowing a user, when the mounting detecting means detects that the reading section is detached from the device body or that the operating section is opened when the power of the device body is turned on, to recognize the fact.

[0018]

The present invention of Claim 6 is characterized in that the transmitting means is display means disposed in the operating section.

[0019]

The present invention of Claim 7 is characterized in that the front transmitting means is a speaker disposed inside the image reading device.

[0020]

The present invention of Claim 8 is characterized by a recording section for recording an image on a recording sheet to be conveyed inside the device body thereof, wherein the transmitting means is a recording operation onto a recording sheet to be performed by the recording section.

[0021]

The present invention of Claim 9 is characterized by a white reference member having a white reference face as a reference for a shading of a document to be conveyed inside the reading section guide at a position to be opposite to the reading means, so as to read the shading of the document on the basis of the white reference data obtained by reading the white reference face by the reading means.

[0022]

The present invention of Claim 10 is characterized in that the reading section functions as a hand scanner capable of manually reading the document when it is detached from the device body.

[0023]

[Operation]

In accordance with the above-described structure, when the operating section is in a closed state with respect to the device body and the reading section is in a state of being mounted to the device body, the actuating member of the mounting detecting means is moved by the reading section to turn the detecting sensor ON, whereby the image reading device becomes capable of reading a document.

[0024]

When the operating section is opened from the device body or the reading section is detached from the device body, the reading section is separated from the actuating member of the mounting detecting means and the detecting sensor is turned off, so that the image reading device becomes incapable of reading a document. In this manner, an opening of the operating section and the detachment of the reading section from the device body can be recognized by one mounting detecting means. As a result, it is possible to realize an image reading device which can be manufactured at a low cost with the device body in a small size and which is capable of reading a document excellently all the time with an excellent assembling performance.

[0025]

[Embodiments of the Invention]

An embodiment of the present invention will be described hereinafter with reference to the drawings.

[0026]

Fig. 1 is a schematic sectional view of the facsimile device as the image reading device of the embodiment of the present invention.

[0027]

In Fig. 1, the device is provided with a document inserting port 1; a document bunch 2; a schematically shown document presence/absence detecting sensor 3; a separating roller 4; a separating piece 5; a separating piece pressing

spring 6; an operation panel 7; keys 8 on the operation panel 7; a separated sheet of document 9; a document conveying path 10 of the document 9; a feeding roller 11a; a feeding runner 11b; a feeding roller pair 11 formed of the feeding roller 11a and the feeding runner 11b; a pressing spring 12 for the feeding runner and discharging roller; a schematically shown document tip/rear end detecting sensor 13; a reading sensor (reading means) 14 which is a contact-type image sensor; a white reference member 15 which is a reading sensor opponent member; a discharging roller 16a; a discharging runner 16b; a discharging roller pair 16 formed of the discharging roller 16a and the discharging runner 16b; a photointerruptor sensor (mounting detecting sensor) 17 for detecting attachment/detachment of a reading section and opening/closing of an operating section; a reading section attachment/detachment and operating section opening/closing detecting sensor actuator (operating member) 18; a document discharge port 19; and a reading section 20 including a reading sensor 14 and discharging runner 16b.

[0028]

The detecting sensor 17 and operating member 18 constitute mounting detecting means 17, 18 which detect the opened/closed state of an operating section 22 and the attachable/detachable state (mounted state) of the reading section 20.

[0029]

Numeral 31 denotes a stacking tray on which the

document bunch 2, or recording sheets (not shown) are stacked. The document conveying path 10 is formed by a reading section guide 21a as an upper guide including the separating roller 4, feeding runner 11b, discharging roller 16a, and the like which are disposed on the side of the operating section 22; a lower guide including the feeding roller 11a and discharging runner 16b, and the like which are disposed on the side of a device body 30; and the like. The operating section 22 is provided with the operation panel 7 including the operating keys 8. The operation panel 7 is provided with a display section (display means) 33 as transmitting means for informing a user of the opened state of the operating section 22, or the detached state of the reading section 20.

[0030]

(1) Reading Operation when Reading Section is attached to Device Body

Here, document conveying flow in the operation which comprises attaching the reading section 20 to the device body 30, conveying the sheet document 9 through the document conveying path 10 in the device body 30, and reading image information of the document 9 by the reading sensor 14 will be described with reference to Fig. 1 (referred to as the sheet through reading operation).

[0031]

In Fig. 1, when the document bunch 2 is inserted to the document inserting port 1 of the device, the document presence/absence detecting sensor 3 transmits a signal to

a control section (CPU) 40, and the device recognizes that there is a document. Furthermore, the document bunch 2 is inserted so as to reach a document separating section which is provided with the separating roller 4 and the separating piece 5 disposed opposite to the separating roller 4 to the document conveying path 10. The separating piece 5 is subjected to a biasing force in a direction in which the separating roller 4 is pressed by the separating piece pressing spring 6. Here, by depressing the key 8 on the operation panel 7, a reading drive system (not shown) is operated, and the separating roller 4 rotates in a direction in which the document bunch 2 is conveyed.

[0032]

The document bunch 2 is separated sheet by sheet when held between the rotating separating roller 4 and the separating piece 5 pressed onto the separating roller 4 by the separating piece pressing spring 6. The separated document 9 is conveyed through the document conveying path 10 by the rotating separating roller 4, and conveyed to the position of the feeding roller pair 11 of the feeding roller 11a and the feeding runner 11b. The feeding runner 11b is subjected to a biasing force in a direction in which the feeding roller 11a is pressed by the pressing spring 12, and the pressing spring 12 is adjusted so that the document 9 is conveyed with an adequate conveying force by rotation of the feeding roller 11a.

[0033]

For the document 9 conveyed by the feeding roller pair 11, a document tip end is detected by the schematically shown document tip/rear end detecting sensor 13. After the document tip end is detected, the reading drive system (not shown) rotates by a certain number of steps S1, so that the document 9 is conveyed by a certain constant distance T1. Here, the reading sensor 14 performs a reading operation to read the white reference face of the white reference member 15 which is disposed opposite to the reading sensor 14 to the document conveying path 10 and pressed by its own weight to the reading sensor 14.

[0034]

In this case, the conveying distance T1 of the document 9, that is, the number of steps S1 of the drive system is adjusted so that the tip end of the document 9 should not reach the reading point of the reading sensor 14, or the tip end of the document 9 should not lift upward the white reference face of the white reference member 15 in Fig. 1.

[0035]

Data obtained by reading the white reference face of the white reference member 15 is used as shading reference data in a series of reading operations. In white/black reading, the data is used as the reference data of shades of white/black, and in color reading, the data is used as the reference data of shades of white/black, red, green, and blue.

[0036]

When the white reference reading is completed, the reading drive system (not shown) rotates by a certain constant number of steps S2, so that the document 9 is conveyed by a certain constant distance T2. Here, the image information reading operation of the document 9 is started. As the reading operation of document image information advances, the document 9 is conveyed to the left in Fig. 1, and the document 9 is then conveyed by the feeding roller pair 11 and the discharging roller pair 16. The discharging roller 16a is subjected to the biasing force in the direction in which the discharging runner 16b is pressed by the pressing spring 12. The conveying force of the discharging roller pair 16, that is, the pressing force of the pressing spring 12 for the feeding runner and discharging roller is adjusted, so that even when the document 9 is conveyed by the feeding roller pair 11 and the discharging roller pair 16, or even when the document is conveyed only by the discharging roller pair 16 as described later, excellent conveying property is held.

[0037]

As the reading operation of document image information advances, the document 9 is further conveyed toward the left in Fig. 1, and a document rear end is detected by the schematically shown document tip/rear end detecting sensor 13. After the detection of the document rear end, the reading drive system (not shown) rotates by a certain

constant number of steps S3, and the document is conveyed by a certain constant distance T3. Here, the reading operation of image information of the document 9 is completed. Additionally, after the rear end of the document 9 passes through the feeding roller pair 11, the document 9 is conveyed only by the conveying force of the discharging roller pair 16.

[0038]

When the image information reading operation is completed, the document 9 is further conveyed toward the left in Fig. 1 by the discharging roller pair 16, and discharged to the outside of the device via the document discharge port 19.

[0039]

Additionally, after the completion of the image information reading operation of the document 9, when the document presence/absence detecting sensor 3 still detects that there is a document, the device starts its reading operation of a second sheet of document. Here, regardless of the detection result of the document presence/absence detecting sensor 3, during the reading operation of a first sheet of document 9, the reading drive system (not shown) rotates. Therefore, when the first sheet of document 9 passes out of the document separating section formed of the separating roller 4 and the separating piece 5, the second sheet of document starts to be conveyed. In this case, the rotating speed of the feeding roller 11a or the separating

roller 4, and the drive section of the separating roller 4 are adjusted, so that an adequate interval is made between the first and second sheets of document 9, and excellent reading operation of a plurality of sheets can be performed.

[0040]

By repeating this procedure, the reading operation of image information of all document sheets in the document bunch 2 inserted via the document inserting port 1 is performed. Subsequently, when the reading operation of the last sheet of the document bunch 2 is completed, and the last sheet of document is securely discharged to the outside of the device, a series of sheet through reading operations are completed.

[0041]

Additionally, the above-described white reference reading operation is performed before the image information reading of the first sheet of document 9, not before the image information reading of the second and subsequent sheets of document.

[0042]

(2) Description of Reading Section
Attachment/Detachment and Operating Section
Opening/Closing Detecting Sensor

The reading section attachment/detachment and operating section opening/closing detecting sensor will next be described with reference to Figs. 2 to 4.

[0043]

Fig. 2 is a schematic sectional view in the vicinity of the reading section, while the reading section is mounted on the facsimile device body 30 and the operating section 22 is closed in the facsimile device according to the embodiment of the present invention. Fig. 3 is a schematic sectional view in the vicinity of the reading section, while the reading section is mounted on the facsimile device body 30 and the operating section is opened in the above-described facsimile device. Fig. 4 is a schematic sectional view in the vicinity of the reading section, while the reading section is detached from the facsimile device body 30 and the operating section 22 is closed in the facsimile device.

[0044]

In Figs. 2 to 4, since the reading sensor 17 comprises a contact-type image sensor, which contributes to the compactness of the reading section 20 and further to the compactness of the device body 30.

[0045]

Moreover, the sensor 17 for detecting the attachment/detachment of the reading section 20 and the opening/closing of the operating section is an inexpensive transmission type photointerruptor, which contributes to cost reduction of the device body 30. Moreover, the sensor 17 for detecting the attachment/detachment of the reading section and opening/closing of the operating section is mounted on an end portion 32 on an operation control electric substrate 24. Therefore, an electric circuit around the

sensor can be disposed on the operation control electric substrate 24. Moreover, wiring for transmitting ON/OFF signal of the sensor 17 for detecting the attachment/detachment of the reading section 20 and opening/closing of the operating section becomes unnecessary. This contributes to the cost reduction and compactness of the device body 30, and additionally to enhancement of assembling property.

[0046]

Furthermore, the sensor actuator 18 for detecting the attachment/detachment of the reading section 20 and opening/closing of the operating section turns on/off the sensor 17 for detecting the attachment/detachment of the reading section 20 and opening/closing of the operating section, by transmitting/intercepting infrared rays of the photointerruptor.

[0047]

Moreover, a reading guide section 21 includes the separating roller 4, feeding runner 11b, white reference member 15, and discharging roller 16a, and the operating section 22 including the operation panel 7 and the reading guide section 21 is constituted to be rotatable on an operating section rotating center 3 as a support point. Therefore, as shown in Fig. 3, by rotating the operating section 22 in a clockwise direction in Fig. 3, the feeding roller 11a and feeding runner 11b, the reading sensor 14 and the white reference member 15, and the discharging roller 16a and

discharging runner 16b can be detached from each other, and the document conveying path 10 can be opened. As described above, by opening/closing the operating section 22 disposed in the upper front of the device body 30 which is an easily operating place, the reading guide section 21 can be opened/closed, which is a constitution superior in operating property.

[0048]

Additionally, numeral 25 denotes an abutment section on the reading section 20 of the sensor actuator (operating member) 18 for detecting the attachment/detachment of the reading section 20 and opening/closing of the operating section; 26 denotes an infrared ray shielding section of the sensor actuator 18 for detecting the reading section attachment/detachment and operating section opening/closing, for intercepting the infrared rays of the photointerruptor sensor 17 for detecting the attachment/detachment of the reading section 20 and opening/closing of the operating section; and 27 denotes a rotating center of the sensor actuator 18 for detecting the attachment/detachment of the reading section 20 and opening/closing of the operating section.

[0049]

In Fig. 2, the reading section 20 is mounted on the device body 30, and the operating section 22 is closed. In this case, when the reading section abutment section 25 of the sensor actuator 18 for detecting the

attachment/detachment of the reading section 20 and opening/closing of the operating section abuts on a guide face 20a of the reading section 20, the sensor actuator 18 for detecting the attachment/detachment of the reading section 20 and opening/closing of the operating section rotates about the rotating center 27 as the support point in the clockwise direction in Fig. 2. The infrared ray shielding section 26 of the sensor actuator 18 for detecting the attachment/detachment of the reading section 20 and opening/closing of the operating section intercepts the infrared rays of the photointerruptor sensor 17.

[0050]

Therefore, the photointerruptor sensor 17 for detecting the reading section attachment/detachment and operating section opening/closing is turned on, and the device body 30 is constituted to recognize that the reading section 20 is mounted the device body 30 and the operating section 22 is closed.

[0051]

In Fig. 3, the reading section 20 is mounted on the device body 30, and the operating section 22 is opened. In this case, the reading section abutment section 25 of the sensor actuator 18 for detecting the attachment/detachment of the reading section 20 and opening/closing of the operating section is detached from the guide face 20a of the reading section 20. Then, the sensor actuator (operating member) 18 for detecting the reading section attachment/detachment

and operating section opening/closing rotates by its own weight using the rotating center 27 as the support point in a counterclockwise direction in Fig. 3. The infrared ray shielding section 26 of the sensor actuator 18 for detecting the reading section attachment/detachment and operating section opening/closing moves, so that the infrared rays of the photointerruptor sensor 17 are transmitted without being intercepted.

[0052]

Therefore, the photointerruptor sensor 17 for detecting the reading section attachment/detachment and operating section opening/closing is turned off, and the device body 30 is constituted to recognize that the reading section 20 is detached from the device body 30 or the operating section 22 is opened.

[0053]

In Fig. 4, the reading section 20 is detached from the device body 30, and the operating section 22 is closed. In this case, the abutment section 25 of the sensor actuator 18 for detecting the reading section attachment/detachment and operating section opening/closing fails to abut on the reading section 20. In the same manner as in Fig. 3, the sensor actuator 18 for detecting the reading section attachment/detachment and operating section opening/closing rotates by its own weight using the rotating center 27 as the support point in the counterclockwise direction in Fig. 4. Then, the infrared ray shielding section

26 of the sensor actuator 18 for detecting the reading section attachment/detachment and operating section opening/closing moves, and the infrared rays of the photointerruptor sensor 17 are transmitted without being intercepted.

[0054]

Therefore, the photointerruptor sensor 17 for detecting the reading section attachment/detachment and operating section opening/closing is turned off, and the device body 30 is constituted to recognize that the reading section 20 is detached from the device body 30 or the operating section 22 is opened.

[0055]

Here, even in the case where the operating section 22 is opened as shown in Fig. 3, or where the reading section 20 is detached from the device body 30 as shown in Fig. 4, the sensor actuator 18 for detecting the reading section attachment/detachment and operating section opening/closing rotates by its own weight in the counterclockwise direction in Figs. 3 and 4, and the infrared ray shielding section 26 moves, so that the infrared rays of the photointerruptor sensor 17 are securely transmitted.

[0056]

(3) Reading Operation when Reading Section 20 is detached from Body

A reading operation which comprises detaching the reading section 20 from the body, and scanning on the image

information face of the document 9 to perform reading will next be described (this reading operation is called the hand scanner reading operation).

[0057]

Fig. 5 is a schematic perspective view when the attachable/detachable reading section 20 is detached from the device body 30, and used as the hand scanner.

[0058]

As shown in Fig. 5, the reading section 20 is removed from the device body 30, and the reading section 20 is placed so that the reading face of the reading sensor 14 turns to the image information face of a document 28. In this case, since the device body 30 is in the mode shown in Fig. 4, it is recognized that the reading section 20 is detached from the device body 30.

[0059]

Here, when the key (not shown in Fig. 5) on the operation panel is depressed, an image information reading standby state is obtained. Subsequently, when the reading section 20 scans on the image information face of the document 28 in Fig. 5 by the user's manual operation, the discharging runner 16b rotates. This is detected by an encoder incorporated in the reading section 20, and the image information reading operation starts. Subsequently, by depressing the key on the operation panel, the image information reading operation is completed, thereby ending a series of hand scanner reading operations.

[0060]

(4) White Reference Data when Hand Scanner Reading Operation is performed

As described in (1), in the sheet through reading operation, since the white reference member is disposed opposite to the reading sensor, by reading the white reference face of the white reference member every time the series of reading operations are performed, white reference data can be taken. However, in the hand scanner reading operation, since the white reference member 15 is attached to the device body 30, the white reference face cannot be read.

[0061]

Therefore, in the embodiment, the white reference data before the reading section 20 is removed from the body is used as the white reference data during the hand scanner reading operation.

[0062]

First, when the power supply of the device body 30 is turned on, the device body 30 confirms that the photointerruptor sensor 17 for detecting the reading section attachment/detachment and operating section opening/closing is in ON state, and confirms that, as shown in Fig. 2, the reading section 20 is mounted on the device body 30, and the operating section 22 is closed. Subsequently, by reading the white reference face of the white reference member 15, the reading sensor 14 takes in the white reference data.

[0063]

Thereafter, when the hand scanner reading operation is performed, the above-described white reference data when the power supply is ON is used.

[0064]

Moreover, when the sheet through reading operation described in (1) is performed before performing the hand scanner reading operation, the white reference data is read during the sheet through reading operation, and the white reference data is overwritten. Therefore, when the hand scanner reading operation is performed later, the white reference data read during the sheet through reading operation is used.

[0065]

Here, when the reading section 20 is removed from the device body 30 and the power supply is ON, the white reference data before the reading section 20 is removed from the body does not exist. In this case, as shown in Fig. 4, the sensor actuator 18 for detecting the reading section attachment/detachment and operating section opening/closing rotates in the counterclockwise direction in Fig. 4, and the photointerruptor sensor 17 is in OFF state. The device body 30 (transmitting means) is constituted to inform the device user by display of LCD 33 (display means) on the operation panel 7 that the reading section 20 is removed from the device body 30. Subsequently, when the device user mounts the reading section 20, the white reference data is

normally taken.

[0066]

Moreover, as shown in Fig. 3, when the reading section 20 is mounted on the device body 30, but the operating section 22 is opened, and the power supply is ON, the reading sensor 14 is apart from the white reference member 15, so that the white reference data cannot be taken. Even in this case, the photointerruptor sensor 17 for detecting the reading section attachment/detachment and operating section opening/closing is in OFF state. Therefore, the device body 30 is constituted to inform the device user by the LCD display on the operation panel that the operating section 22 is opened. Subsequently, when the device user closes the operating section 22, the white reference data is normally taken.

[0067]

Additionally, in the embodiment, as the means for allowing the device user to recognize that the reading section 20 is removed from the device body 30, or the operating section 22 is opened when the power supply is ON, the LCD display on the operation panel has been described, but even when other transmitting means such as display on the operation panel by LED lighting, voice of message from a speaker device 35 (see Fig. 1) incorporated in the device body 30, and message recording onto the recording sheet by the recording device disposed on the device body are used, the similar effects can be obtained.

[0068]

[Effect of the Invention]

As described above, according to the present invention, the operating member of detecting means provided on the openable/closable operating section in the device body is moved by the reading section attachable to/detachable from the device body to turn ON/OFF the detecting sensor of mounting detecting means, and the released state of the operating section, and the detached state of the reading section can be recognized. Therefore, the releasing of the operating section and the removing of the reading section from the device body can be recognized by one mounting detecting means, which realizes the reduction of the device body in cost and size. Additionally, excellent document reading can constantly be performed, and the image reading device superior in assembling property can be realized.

[Brief Description of the Drawings]

[Figure 1]

A longitudinal sectional front view of the facsimile device serving as an image reading device according to an embodiment of the present invention.

[Figure 2]

A longitudinal sectional front view in the vicinity of the reading section while the reading section is attached to the facsimile device body and the operating section is closed in the same embodiment.

[Figure 3]

A longitudinal sectional front view in the vicinity

of the reading section while the reading section is attached to the facsimile device body and the operating section is opened in the same embodiment.

[Figure 4]

A longitudinal sectional front view in the vicinity of the reading section while the reading section is detached from the facsimile device body and the operating section is closed in the same embodiment.

[Figure 5]

A perspective view of the reading section when the reading section attachable to/detachable from the device body is detached from the device body and used as a hand scanner in the same embodiment.

[Description of Reference Numerals or Symbols]

- 2 ... document bunch
- 7 ... operation panel
- 10 ... document conveying path
- 14 ... reading sensor (reading mean)
- 17 ... photointerruptor sensor (mounting detecting means) for detecting attachment/detachment of a reading section and opening/closing of an operating section
- 18 ... actuator (actuating member)
- 17, 18 ... mounting detecting means
- 20 ... reading section
- 20a ... abutment face of the reading section
- 21a ... upper guide of the document conveying path (reading section guide)

- 21b ... lower guide of the document conveying path
- 22 ... operating section
- 24 ... operation control electric substrate
- 27 ... rotating center of the actuating member 17
- 33 ... display section (display means serving as transmitting means)
- 35 ... speaker device (transmitting means)
- 40 ... control section (display means)

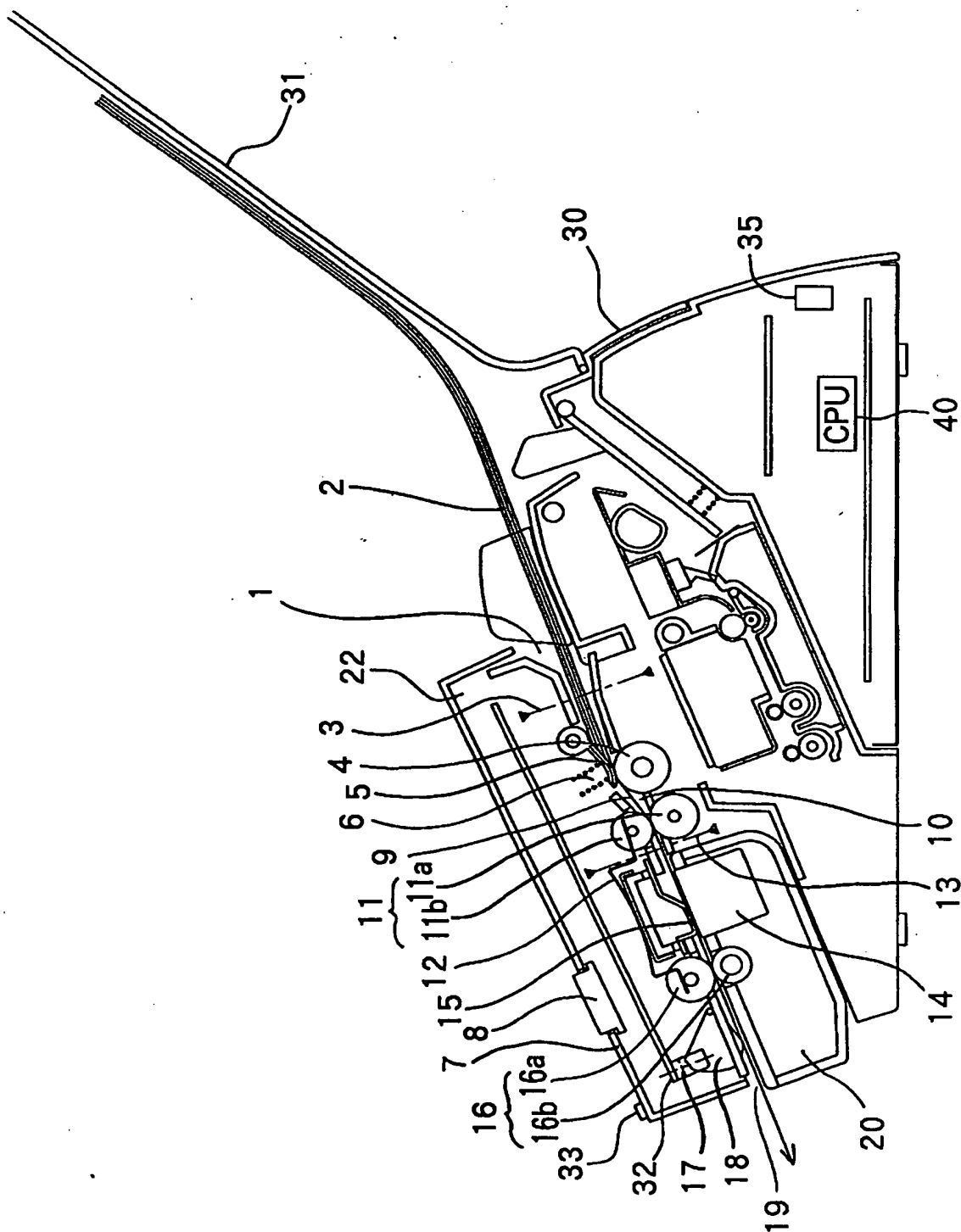
【書類名】

図面

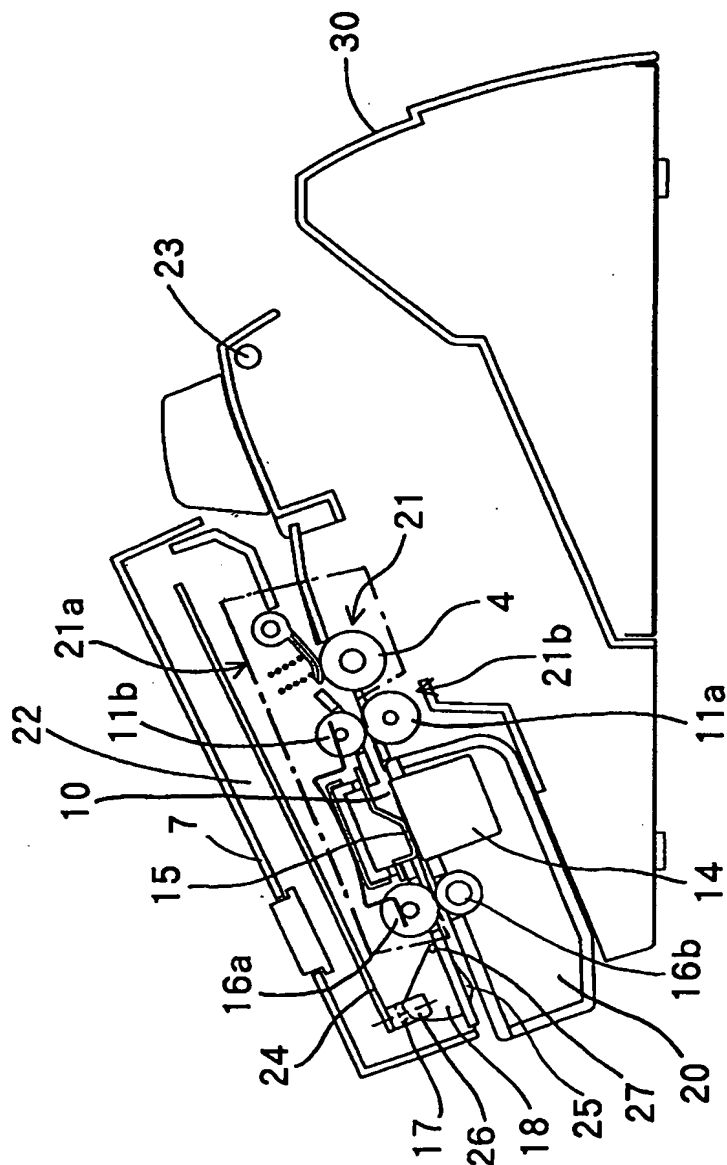
[Name of the Document] Drawings

【図1】

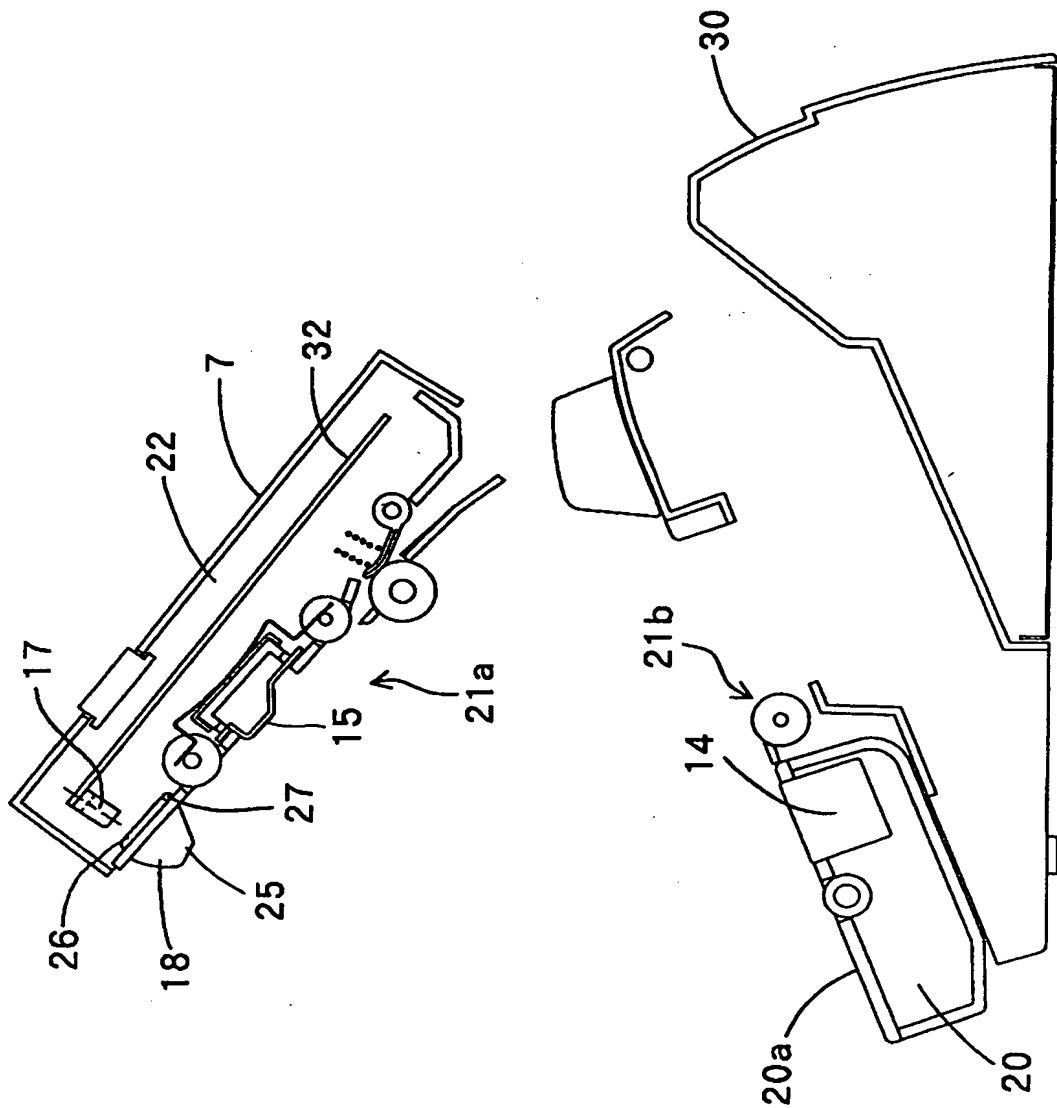
Fig. 1



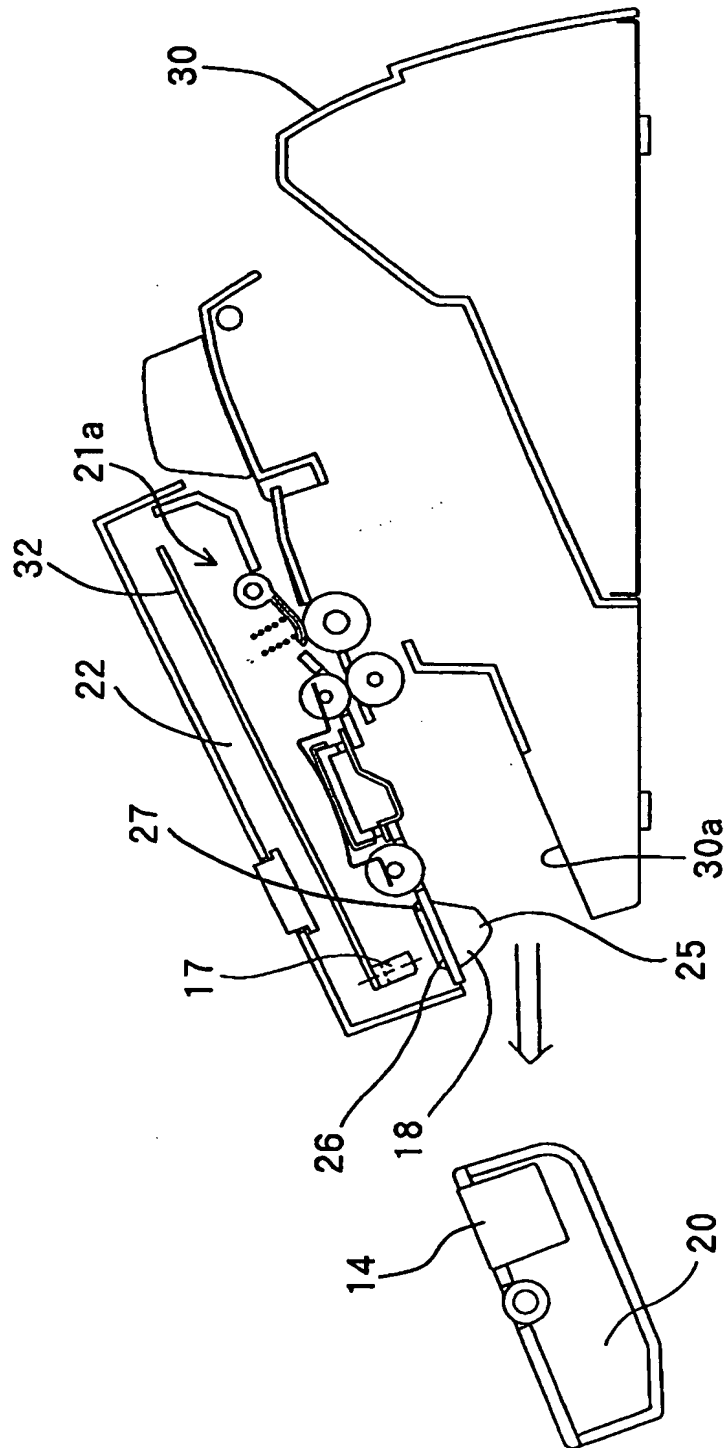
【図 2】 Fig. 2



【図3】 Fig. 3

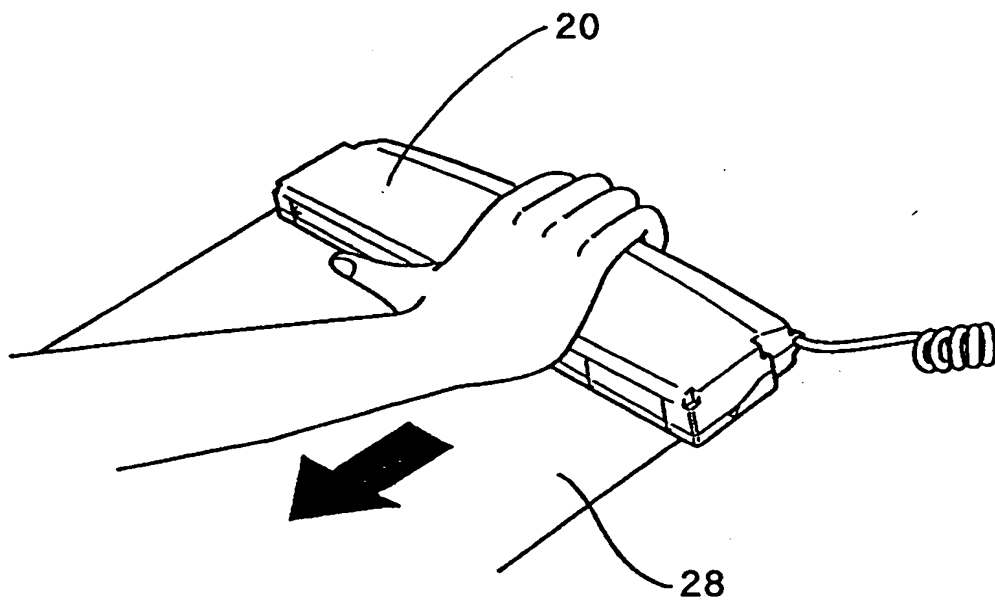


【図 4】 Fig. 4



【図 5】

Fig. 5



[Name of the Document]

Abstract

[Problem]

An object of the present invention is to realize an image reading device which can be manufactured at a low cost with the main body in a small size, and with an improved assembling performance.

[Means for solving the Problem]

An operating section 22 is disposed to be openable/closable and a reading section 20 is disposed to be attachable/detachable with respect to a device body 30. A detecting sensor 17 and a rotatable actuator 18 are disposed in the operating section, and the actuator is arranged to be movable from the reading section which is mounted on the device body, whereby the opening/closing of the operating section and the attachment/detachment of the reading section can be recognized by the single mounting detecting means 17, 18.

[Elected Drawing]

Figure 1